

131-1-12/14

AUTHOR: Bondar', I. A. , Reviewer

TITLE: Investigation of the Decomposing Influence Exerted by Fluorine-Containing Blast-Furnace Slags Upon Refractory Materials
(Issledovaniye raz'yedayushchego deystviya ftorsoderzhashchikh domennykh shlakov na ogneupory)

PERIODICAL: Ogneupory, 1958, Nr 1, pp. 44 - 45 (USSR)

ABSTRACT: These investigations are performed in the Institute for Metallurgy and Ceramics AN China under the direction of Doctor Yan'Dun-syn. These works developed in connection with the necessity of the melting of the iron-ores Baotou which contain considerable quantities of calcium-fluorine. When these ores are molten, fluorine goes into the slag and destroys the refractory furnace-lining. The results of these investigations were by the authors given in an article published in the new Chinese periodical "Silicates" ("Shi Suan-yen"). The influence exerted by fluorines upon fire-clay-, highly aluminiferous (65 and 80 % Al_2O_3) and carbon-containing bricks, was investigated in the laboratory. The speed of decomposition of the bricks was investigated in dependence on the modifications: 1.) of temperature in the interval of from 1350 to 1550°C; 2.) the slag

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Investigation of the Decomposing Influence
Exerted by Fluorine-Containing Slags Upon Refractory Materials

basicity of from 1,0 to 2,5; 3.) the fluorine content in the slags (from 0 to 10 %) and of aluminum oxide (from 15 to 30 %). 18 kinds of slag obtained in a synthetical way from SiO_2 , Al_2O_3 , CaO , CaF_2 and alkalies were examined. The mixtures were molten in a high-frequency furnace and quenched in water. The investigations were carried out according to 2 methods: the dynamical and the statical one which are described and explained in detail. It was shown that the rate of destruction of the refractory materials increased with increasing slag-basicity, fluorine-content and temperature. The slag resistance of highly aluminiferous bricks is higher than that of fire-clay bricks. The destruction of carbon-containing bricks by slags is insignificant. The problem of the destruction of the furnace-linings by fluorine-containing slags is considered complicated and important. Their investigation may be facilitated by the thorough examination of the equilibriums in the multicomponent systems, especially in the 4-component system $\text{CaO} - \text{Al}_2\text{O}_3 - \text{SiO}_2 - \text{CaF}_2$. Such examinations are made in the Institute for Chemistry of Silicates AN USSR (reference). There is 1 Chinese reference.

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Investigation of the Decomposing Influence
Exerted by Fluorine-Containing Slags Upon Refractory Materials

ASSOCIATION: Institute for Metallurgy and Ceramics AN China
(Institut metallurgii i keramiki AN Kitaya)

AVAILABLE: Library of Congress

1. Metallurgy 2. Refractory materials 3. Fluorine-Effects

Card 3/3

30-58-4-14/44

AUTHORS: Bondar', I. A., Sazonova, M. V.

TITLE: At the Institutes of the German Academy of Sciences in Berlin (DDR) (V institutakh Germanskoy Akademii nauk v Berline, GDR)

PERIODICAL: Vestnik Akademii Nauk SSSR, 1958, . Nr 4, pp.78-79 (USSR)

ABSTRACT: In October 1957 the authors visited a number of institutes in Berlin (DDR). At the Institute for Inorganic Chemistry, Director Ye. Tilo, investigations in the field of physico-chemistry as well as of silicate technology were carried out (various types of condensed phosphates, syntheses of silicates and others). The tensiometric method, viscosimetry, X-ray- and microscopic analyses, as well as the method of chromatography are applied. At the Institute for Applied Silicate Research, Director is G. Frank, new kinds of refractories for ash furnaces are developed on the basis of alumina with different additions. At the Institute for Crystal Chemistry, Director Boll-Dornberger, silicate structures are investigated. At the Institute for Applied Silicate Technology of the Mining College (Freyberg) up to 70 graduates leave the school every year. The academic institutes work in

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30-58-4-14/44
At the Institutes of the German Academy of Sciences in Berlin (DDR)

relation with world known firms, the Ceramic Factory at Khermsdorf and the Shott Glass Factory, where they own experimental plants and scientific research laboratories. The authors underline that in the mentioned institutes mainly young specialists are working. There are 3 - 4 assistants and technical specialists for each scientist. Also the high quality of the apparatus produced in the mechanical workshops of the institutes is pointed out.

1. Chemistry--East Germany

Card 2/2

BCNDTR 7.7
TOROPOV, N.A.; BONDAR', I.A.

Crystallization of dicalcium and tricalcium silicates in cements
having a high content of iron oxide. TSement 24 no.1:18-22 Ja-Fe
'58. (MIRA 11:4)

(Portland cement)
(Calcium silicates)

5(4)

AUTHORS:

Toropov, N. A., Bondar', I. I.

SOV/62-59-3-30/37

TITLE:

Lanthanum Silicate $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$ (Silikat lantana $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 3, pp 554-555 (USSR)

ABSTRACT:

This is a brief communication on the synthesis of lanthanum silicate $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$ ($\text{La}_4\text{Si}_3\text{O}_{12}$) which was carried out in the investigation of the system $\text{La}_2\text{O}_3 - \text{SiO}_2$. The synthesized silicate melts at $2,020^\circ$ without decomposition. Microscope and X-ray structural analyses have shown that it is characterized by hexagonal syngony (Figs 1,2). The compound $\text{La}_4\text{Si}_3\text{O}_{12}$ is separated in form of hexagonal lamellae with white and orange interference coloration in polarized light. The mean value of the refraction index of the crystals, which was determined in the section by means of the modernized microscope MIS-11, was 1.90. The pycnometric density of lanthanum silicate corresponds to 5.31 g/cm^3 . As was shown by computations two $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$ molecules are contained in the elementary cell. The density

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Lanthanum Silicate $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$

SOV/62-59-3-30/37

which was determined on the basis of X-ray data is 5.303 g/cm^3 . Apparently $\text{La}_4\text{Si}_3\text{O}_{12}$ belongs, according to its structure to the olivine group with separated tetrahedral anions $[\text{SiO}_4]^{4-}$ and is the lanthanum orthosilicate $\text{La}_4(\text{SiO}_4)_3$. In this case a replacement of the six atoms of the bivalent element by four atoms of trivalent lanthanum ($6\text{Me}^{2+} \rightleftharpoons 4\text{La}^{3+}$) is possible. There are 3 figures, 1 table, and 2 references, 1 of which is Soviet.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences, USSR)

SUBMITTED: July 19, 1958

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5(2)

AUTHORS:

Toropov, N. A., Bondar', I. A.

SOV/62-59-9-2/40

TITLE:

Investigation of the Crystallization Processes in the
CaO-Al₂O₃-SiO₂-system After the Addition of 10% of CaF₂

PERIODICAL:

Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk,
1959, Nr 9, pp 1520-1525 (USSR)

ABSTRACT:

The present investigation was carried out in cooperation with the Institute of Metallurgy and Ceramics of the Academy of Sciences of the Chinese People's Republic (Doctor Yang Tun-sung) to study the corroding effect of fluorine containing blast-furnace slag on refractories. The following authors who studied this problem are listed: Karandeyev (Ref 3), Ol'shanskiy (Ref 6), Yershova (Ref 7), Lapin (Ref 8). The synthesis of the samples was carried out in a vacuum furnace in an argon flow at high temperatures. The samples were subsequently thermally treated at various temperatures. They were investigated with polarization- and electron-microscopes. The fluorine loss suffered in preparation and thermal treatment was only 0.09 - 0.05%. The primary crystallization range and the melting range were determined by the diagram. An addition of 10% CaF₂ to the ternary system

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SOV/62-59-9-2/40

Investigation of the Crystallization Processes in the $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$ -system
After the Addition of 10% of CaF_2

proved to extend the melting range considerably (lowering of the liquefaction temperature) (Fig 1). The congruent character of the mullite melts was also confirmed. Separated drops of a basic glass were observed in the silica glass by means of the polarization microscope. The radii of the forming nuclei of the new glass were calculated according to the formula set up by Frenkel' which is discussed in Umanskiy's book (Ref 11). The dependence of the length of the radius on the temperature can be determined with this formula (Fig 4). The radii increase continuously with the rising hardening temperature up to a maximum when the new formation of nuclei prevents further increase. The addition of CaF_2 does not change the boundary of the phases, but lowers liquefaction temperature and changes the arrangement of the field boundaries of several phases. These phases are determined. There are 7 figures and 11 references, 7 of which are Soviet.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of
Card 2/3 Silicate Chemistry of the Academy of Sciences, USSR)

Bondar', I. A.

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S/062/60/000/02/01/012
B003/B066

15.2210

AUTHORS:

Toropov, N. A., Bondar', I. A.

TITLE:

Silicates of Rare Earths. 1st Report. Phase Diagram of the
System La_2O_3 - SiO_2

PERIODICAL:

Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk.
1960, No. 2, pp. 153 - 156

TEXT: The present paper deals with the binary system La_2O_3 - SiO_2 . 99.90% of SiO_2 powder and 99.3% of La_2O_3 were used as initial substances for preparing the various mixtures. The individual samples were studied by means of a microscope and X-ray structural analysis. The refractive indices of highly refractive substances were determined by means of an improved MMC-11 (MIS-11) microscope. A change of the valence of lanthanum by heating La_2O_3 in an argon atmosphere was found to be negligible on the basis of changes in weight and volumetric determinations of the LaO content, respectively (LaO content at 1800°C - 0.15 per cent by weight, X)

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S/062/61/000/004/002/008
B118/B208

15. 2100 1142, 1273, 1145

AUTHORS: Toropov, N. A. and Bondar', I. A.

TITLE: Silicates of rare earth elements. 3. Phase diagram of the binary system yttrium oxide - silicon dioxide

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, no. 4, 1961, 544-550

TEXT: The purpose of the present study was the determination of the phase diagram of the system Y_2O_3 - SiO_2 . The starting materials were: silicon dioxide (99.9% SiO_2), yttrium oxide (the percentage content of the rare earth oxides was 99.9%, the content of yttrium oxide 99.42%, of the oxides of the other rare earths 0.55%, of Ca 0.02%, of Fe <0.01%, of copper 0.05%). The mixed samples were annealed and hardened. The resultant products were submitted to microscopic and X-ray structural analysis, in some cases also to chemical analysis. The constants of the Y_2O_3 obtained by the authors fairly corresponded to those in publications. The equal result indicates a cubic form of the yttrium oxide, which does not change

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Silicates of rare earth...

by melting in the electric arc. The roentgenogram of this product is given in diagram 16. The resultant phase diagram of the system $Y_2O_3-SiO_2$ is represented in Fig. 3. Compound $Y_2O_3 \cdot SiO_2$ melts without decomposition at $1980 \pm 50^\circ C$. Compound $2Y_2O_3 \cdot 3SiO_2$ melts without decomposition at $1950 \pm 50^\circ C$ and remains stable between 1950 and 1650° ; at $1950^\circ C$ it decomposes into a mixture of the compounds $Y_2O_3 \cdot SiO_2$ and $Y_2O_3 \cdot 2SiO_2$ (a reversible process: $2Y_2O_3 \cdot 3SiO_2 \rightleftharpoons Y_2O_3 \cdot SiO_2 + Y_2O_3 \cdot 2SiO_2$). Compound $Y_2O_3 \cdot 2SiO_2$ melts with decomposition to $2Y_2O_3 \cdot 3SiO_2$ and a liquid, at $1775^\circ C$. Temperature and composition of the invariant points are given in Table 3. There are 6 figures, 5 tables, and 13 references: 4 Soviet-bloc and 9 non-Soviet-bloc. The three references to English-language publications read as follows: C. E. Curtis, I. R. Johnson, I.Amer.Ceram.Soc. 40, 15 (1957); C. E. Curtis, A. G. Tharp, I.Amer.Ceram.Soc. 42, 151 (1959); P. H. Aldred, A.E.S.White, Trans.Brit.Ceram.Soc. 58, 200 (1959).

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15.2100 only 3309, 3009

23586
S/062/61/000/005/001/009
B118/B208

AUTHORS: Toropov, N. A. and Bondar', I. A.

TITLE: Silicates of rare earth elements. Communication 4. New silicates in the system $\text{La}_2\text{O}_3\text{-SiO}_2$

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 5, 1961, 739 - 744

TEXT: In addition to the previously detected compound $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$, two further compounds $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ and $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ were found to be formed in the system $\text{La}_2\text{O}_3\text{-SiO}_2$. A new variant of the phase diagram of the system $\text{La}_2\text{O}_3\text{-SiO}_2$ is presented in the diagram 1, a, 6 basing on a method devised earlier. A range of demixing in wide temperature and concentration limits, and three compounds were found in the system: $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$, $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$, and $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$. Compound $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ (1:1) melts at $1930 \pm 50^\circ\text{C}$ without decomposition. The structural formula $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ may be understood as the Card 1/6

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oxy-orthosilicate of lanthanum $\text{La}_2\text{O}(\text{SiO}_4)$. $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$ is stable between 1600 and 1975°C and melts at 1975°C without decomposition; at 1600°C it decomposes to give two compounds: $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ and $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$. Compound $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ (1:2) melts at 1750°C and decomposes to $2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$ and a liquid. This lanthanum silicate is a pyrosilicate with the formula $\text{La}_2\text{Si}_2\text{O}_7$ in structural respects. The range of separation into layers is represented in the phase diagram of the system by the binodal curve, with a critical temperature 2050°C of the state of demixing, and with the composition 25 % La_2O_3 and 75 % SiO_2 (in wt %). The lanthanum silicates are compared with a number of calcium and aluminum silicates. Table 4 compares the properties of the silicate $\text{La}_4(\text{SiO}_4)_3$ with those of $\alpha\text{-Ca}_2(\text{SiO}_4)$. The study of the fine structure of this lanthanum silicate reveals a complete and exact analogy with the silicates of other elements. Table 2 gives the invariant points of the system $\text{La}_2\text{O}_3\text{-SiO}_2$. There are 6 figures, 4 tables, and 8 references: 4 Soviet-bloc and 4 non-Soviet-bloc. The 3 references to

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Silicates of rare earth...

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B118/B208

English-language publications read as follows: E. M. Levin, St. Block, J. Amer. Ceram. Soc. 40 (3), 95 (1957); St. Block, E. M. Levin, J. Amer. Ceram. Soc. 40 (4), 113 (1957); E. M. Levin, St. Block, J. Amer. Ceram. Soc. 41 (2), 49 (1958).

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: March 25, 1960

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15.2220

26400
S/062/61/COO/008/002/010
B117/B2C6

AUTHORS: Toropov, N. A., and Bondar', I. A.

TITLE: Silicates of rare earths. Communication 6. Phase diagrams of binary systems Sm_2O_3 - SiO_2 and Yb_2O_3 - SiO_2 and their comparison with known silicates of other rare earths

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniya khimicheskikh nauk, no. 8, 1961, 1372-1379

TEXT: The authors investigated pyrochemical, crystallooptical, and roentgenographic properties of 12 synthesized compounds. They give phase diagrams for the systems Sm_2O_3 - SiO_2 (Fig. 1, a=% by weight, b=mole%) and Yb_2O_3 - SiO_2 (Fig. 2, a=% by weight, b=mole%). Other systems were described by the authors in previous studies (Ref. 1: N. A. Toropov, I. A. Bondar', Izv. AN SSSR. Otd. khim. n., 1959, 554; Ref. 2: Izv. AN SSSR, Otd. khim. n. 1960, 153; Ref. 4: Izv. AN SSSR. Otd. khim. n. 1961, 544; Ref. 5: Izv. khim. n. 1961, 739; Ref. 3: N. A. Toropov, F. Ya. Galakhov

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and S.F. Kononova, Izv. AN SSSR. Otd. khim. n. 1961, 539; Ref. 6: Detto, Izv. AN SSSR. Otd. khim. n. 1961, 1365). The compounds 1:1 ($\text{Ln}_2\text{O}_3 \cdot \text{SiO}_2$) and 2:3 ($2\text{Ln}_2\text{O}_3 \cdot 3\text{SiO}_2$) were found to melt in all systems without decomposition. In the systems $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$, $\text{Y}_2\text{O}_3 \cdot \text{SiO}_2$ and $\text{Sm}_2\text{O}_3 \cdot \text{SiO}_2$, the compounds 1:2 ($\text{Ln}_2\text{O}_3 \cdot 2\text{SiO}_2$) decompose into compound 2:3 and liquid. In the system $\text{Yb}_2\text{O}_3 \cdot \text{SiO}_2$ the compound 1:2 melts without decomposition. The compounds 2:3 are stable in a certain temperature range. They decompose into 1:1 and 1:2 at temperatures from 1600 to 1675°C. This process is reversible. In structural respect the compounds mentioned may be prepared in the following way: $\text{Ln}_2\text{O}_3 \cdot \text{SiO}_2$ as oxy-orthosilicate $\text{Ln}_2\text{O}[\text{SiO}_4]$, $2\text{Ln}_2\text{O}_3 \cdot 3\text{SiO}_2$ as orthosilicate $\text{Ln}_4[\text{SiO}_4]_3$ and $\text{Ln}_2\text{O}_3 \cdot 2\text{SiO}_2$ as diorthosilicate (pyrosilicate) $\text{Ln}_2\text{Si}_2\text{O}_7$. Three electron configurations are stable: La^{3+} , Gd^{3+} and Lu^{3+} . Ce, Pr, Nd and Sm belong to the subgroup La; Tb, Dy, Ho and Y belong to the subgroup Gd; Er, Tm, Yb and Sc belong to the subgroup Lu. Table 1 gives the properties of the compounds investigated

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Silicates of rare earths...

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with regard to the type of compound and its belonging to one of the electron configurations, according to data by N. A. Toropov, F. Ya. Galakhov, and S. F. Konovalova. It may be seen that the melting points do not show any special dependence on the type of compound. A certain rule could be observed with respect to optical properties and densities. An increase of the refractive indices and the densities of La towards Sm, Y towards Gd, and Er towards Yb may be observed. Moreover, for each type of compounds a reduction of densities and refractive indices is characteristic at the transition from oxy-ortho- to ortho- and finally diorthosilicates. Oxy-ortho- and pyrosilicates are biaxial and optically positive. Orthosilicates are uniaxial and optically negative. Peculiarities of ytterbium and erbium pyrosilicates could be found for the first time. In contrast to the other pyrosilicates, $\text{Er}_2\text{Si}_2\text{O}_7$ and $\text{Yb}_2\text{Si}_2\text{O}_7$ melt without decomposition. Crystals of these compounds have a very strong double refraction, 0.028-0.030 against 0.01 of the other pyrosilicates. The X-ray analysis shows a similarity of the structures for corresponding lanthanum and samarium, gadolinium, dysprosium and praseodymium, erbium and ytterbium compounds. It is possible that silicates of rare

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earths might produce isomorphous mixtures with each other. In this connection, isomorphism will be complete for a number of compounds, for others, an incomplete isomorphous substitution will be possible. In the systems investigated (of the metasilicate type), silicates of stronger acidity were not found experimentally at 1600°C and below. Their composition may be expressed by $\text{Ln}_2(\text{SiO}_3)_3$. This nearly corresponds to the composition for which unmixing starts in the systems (74-77 mole% SiO_2).

Table 2 shows the compositions and temperatures of the coexistence of two liquids and cristobalite, the critical points of unmixing and the saturated composition of the liquid rich in modifier (Ln_2O_3). La may be seen to have the greatest radius ($r=1.22 \text{ \AA}$ according to Pauling) and unmixing starts at 77 mole% SiO_2 . Sm, Y and Yb follow, for which unmixing starts at 75.8, 74.8 and 73.7 mole% SiO_2 . According to studies by

E. M. Levin and St. Block (Ref. 9; 10, 11 see below), the saturated compositions of unmixing, i.e., the compositions of the liquids rich in modifier, may be calculated. Table 2 gives calculated values for four systems. O. A. Yesin and Ya. I. Ol'shanskiy are mentioned. There are

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7 figures, 2 tables, and 13 references: 8 Soviet-bloc and 5 non-Soviet-bloc. The four references to English-language publications read as follows: E. M. Levin, St. Block, J. Amer. Ceram. Soc. 40, (3), 95 (1957); J. Amer. Ceram. Soc. 40, (4), 113 (1957); J. Amer. Ceram. Soc. 41, (2), 49 (1958); E. P. Glasser, I. Warshaw, R. Roy, Phys. Chem. Glasses 1, N 2, 39 (1960).

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry, AS USSR)

SUBMITTED: October 31, 1960

Table 1: Properties of some silicates of rare earths. Legend: 1) Type of compound; 2) type of electron configuration; 3) melting point, °C; 4) stability limit of the compound, °C; 5) refraction indices; 6) double refraction; 7) optical axes; 8) optical sign; 9) density g/cm³; 10) oxy-orthosilicates; 11) orthosilicates; 12) pyrosilicates; 13) melting with decomposition; 14) melting without decomposition;

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L 15678-63

ENP(q)/EWT(m)/BDS - AFTTG JD/JG

ACCESSION NR: AR3003582

S/0081/63/000/008/0061/0061

SOURCE: RZh. Khimiya, Abs. 8p415

AUTHOR: Bondar', I. A.; Korolyeva, L. N.; Toropov, N. A.

TITLE: A diagram of the composition of a binary system of ytterbium oxide-silicon dioxide and a comparison of it with other system of Ln sub 2 0 sub 3-SiO sub 2

CITED SOURCE: Tr. 6-go Soveshchaniya po eksperim. i tekhn. mineralogii i petrogr., 1961. M., AN SSSR, 1862, 303-310

TOPIC TAGS: ytterbium oxide, lanthanum oxide

TRANSLATION: The phase diagram of the system Yb sub 2 0 sub 3 - SiO sub 2 was investigated, and a comparison was carried out with other diagrams of Ln sub 2 0 sub 3 - SiO sub 2. In all systems, the compounds Ln sub 2 0 sub 3-SiO sub 2 and 2Ln sub 2 0 sub 3-SiO sub 2 melt without decomposition; the compounds Ln sub 2 0 sub 3-2SiO sub 2 in the systems Er sub 2 0 sub 3 - SiO sub 2 and

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ACCESSION NR: AR3C03582

Yb sub 2 0 sub 3 - SiO sub 2 melt without decomposition, and in the remaining systems they melt with decomposition into 2Lh. sub 2 0 sub 3-2SiO sub 2 and liquid. The region of phase separation increases upon transition from elements with a large ionic radius to elements with a smaller ionic radius. A calculation of the limiting composition for phase separation, i.e., a calculation of the composition of the liquid, corresponding to the transition from the region of two glasses into regions of homogeneity, was carried out according to the oxygen-volume method on the basis of full radii of oxygen and the cation-modifier and the type of their bond. The results obtained are in agreement with experimental data. Ya. Shenkin

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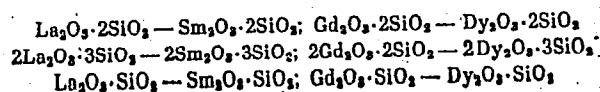
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AUTHORS: Bondar', I. A., Galakhov, F. Ya., and Toropov, N. A.

TITLE: Silicates of rare-earth elements. Communication 7:
Solid solutions between the silicates of lanthanum and
samarium, gadolinium and dysprosium

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh
nauk, no. 3, 1962, 377-382

TEXT: The interaction of rare-earth silicates was studied on binary
systems of oxyortho-, ortho- and diorthosilicates of La and Sm (subgroup I)
and Gd and Dy (subgroup II):



The mixtures of pure ($\sim 98.2-99.9\%$) oxides of La, Gd and Si (crystallized
silica) were tempered at $2000-1500^\circ\text{C}$ in a microvacuum- and platinum
rhodium furnace (40 % Rh). In binary systems of monotypic compounds of the

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silicates of La and Sm, Gd and Dy, continuous series of solid solutions are formed, as their composition and structure are similar and the ionic radii lie close together (La = 1.22 Å, Sm = 1.13 Å, Gd = 1.11 Å, Dy = 1.07 Å). The following systems are typical: (1) diorthosilicates: $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ - $\text{Sm}_2\text{O}_3 \cdot 2\text{SiO}_2$, (2) orthosilicates: $2\text{Gd}_2\text{O}_3 \cdot 3\text{SiO}_2$ - $2\text{Dy}_2\text{O}_3 \cdot 3\text{SiO}_2$ and (3) oxyorthosilicates: $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ - $\text{Sm}_2\text{O}_3 \cdot \text{SiO}_2$. As these systems, with regard to the character of the change of liquidus and solidus curves, belong to the first type of solid solutions by Roozeboom, no decomposition of the solid solutions occurs at a temperature decrease to 1500°C. For isovalent isomorphism, in particular, a regularity between the phase diagrams and the difference of the cationic radii was determined. Up to 15 % difference, the phase diagrams belong to the first type by Roozeboom (La-Sm silicates: ~8 %, Gd-Dy silicates: ~4 % difference). As the diorthosilicates La, Sm, Gd, Dy ($\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$) decompose, during melting, into orthosilicates ($2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$) and glass, a straight line in the phase diagrams separates the crystallization fields of the compounds 2:3 and 1:2. Monophase, granular or polygonal structures were microscopically determined

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Silicates of rare-earth elements...

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in every system in the crystallized compositions for any component ratio. Single phase structure of solid solutions was observed only under near-equilibrium conditions (crystallizing from melts and longer heating). Insufficient heating and great temperature interval between liquidus and solidus produces disequilibrium crystallization of the solid solutions. As the diffusion processes are not terminated here, an inhomogeneous structure is formed (zonal structure). Longer tempering compensates the component concentration and causes granular structure. In all systems from oxy- and diorthosilicates the crystals are biaxial and optically positive, in the systems from orthosilicates they are monoaxial, optically negative and of hexagonal syngony. The optical refraction is for $\text{Sm}_2\text{Si}_2\text{O}_7$:

$n_g = 1.775$, $n_p = 1.765$, for $\text{La}_2\text{Si}_2\text{O}_7$: $n_g = 1.762$, $n_p = 1.752$.

Similarity of the monotypic silicates and continuous change of the interfacial spacings was established for all systems by X-ray phase analysis. The X-ray pictures of the systems $\text{Sm}_2\text{O}_3 \cdot 2\text{SiO}_2$ - $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ and $2\text{Gd}_2\text{O}_3 \cdot 3\text{SiO}_2$ - $2\text{Dy}_2\text{O}_3 \cdot 3\text{SiO}_2$ confirmed the formation of homogeneous ranges. When substituting $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ by various amounts of $\text{Sm}_2\text{O}_3 \cdot 2\text{SiO}_2$, or

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Silicates of rare-earth elements...

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$2\text{Gd}_2\text{O}_3 \cdot 3\text{SiO}_2$ by $2\text{Dy}_2\text{O}_3 \cdot 3\text{SiO}_2$, the diffraction maxima are displaced in the direction of the small values of d . There are 6 figures and 2 tables.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: October 4, 1961

Card 4/4

35587
S/062/62/000/003/002/014
B110/B101

5.2300
AUTHOR:

Bondar', I. A.

TITLE:

Silicates of rare-earth elements. Communication 8: Solid solutions between the silicates of lanthanum and ytterbium

PERIODICAL:

Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 3, 1962, 383-388

TEXT: The systems $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ - $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ and $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ - $\text{Yb}_2\text{O}_3 \cdot \text{SiO}_2$ were studied. Oxides of La, Yb and Si were chilled from 2000 to 1500°C in a vacuum microfurnace or a Pt-Rh furnace. In binary systems of monotypic silicate compounds of La and Yb, no continuous series of solid solutions, but limited solubility with rupture in the middle part of the phase diagram was determined microscopically, by X-ray phase analysis and infrared spectroscopy. Compositions are similar, structures and ionic radii are different ($\text{La} = 1.22 \text{ \AA}$, $\text{Yb} = 1.00 \text{ \AA}$). In the diorthosilicate systems: $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ - $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ and the oxyorthosilicate systems: $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ - $\text{Yb}_2\text{O}_3 \cdot \text{SiO}_2$, the decomposition range of the solid solutions is a

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Silicates of rare-earth...

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narrow region (15-20 %), in which a eutectic mixture of two La- and Yb silicate-base solid solutions is formed. Lanthanum diorthosilicate melts under decomposition into orthosilicate and glass, ytterbium diorthosilicate melts undecomposed. According to liquidus- and solidus character, the system belongs to the fifth type of the phase diagram according to Roozeboom, solubility decreasing with temperature reduction. To this there also corresponds the difference of the ionic radii of La- and Yb silicates (22 %). Two monophasic- and one diphasic range were ascertained microscopically. For $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$, $n_g = 1.762$, $n_p = 1.752$, for $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$, $n_g = 1.770$, $n_p = 1.740$. In the homogeneous ranges of the solid solutions of oxy- and diorthosilicates, the crystals are biaxial and optically positive. X-ray phase analysis produced various structures of monotypic silicates. In the range of solid solutions of the basis of $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ with 0-50 % $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$, with a single crystal phase similar to the $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ lattice, the lines move, on addition of $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$, in the direction of the small values of d, and the lattice constants decrease.

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Silicates of rare-earth...

S/062/62/000/003/002/014
B110/B101

At 90-100 % $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$, the $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ lattice is preserved. At 90 % $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ and 10 % $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$, the lines are displaced against $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ in the direction of the high d values. Substitution of Yb by La extends the lattice. At 30 % $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ and 70 % $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$, two phases exist: (1) a solid solution on the basis of $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ and (2) a solid solution of $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$. There are 5 figures and 1 table.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: October 12, 1961

Card 3/3

G/005/62/000/004/002/002
D029/D109

AUTHORS: Toropov, N.A., and Bondar, I.A. (Leningrad)
TITLE: Liquid separations in the systems rare earths - SiO_2
PERIODICAL: Silikattechnik, no. 4, 1962, 137-139

TEXT: The Institut fuer Silikatchemie der Akademie der Wissenschaften der UdSSR (Institute for Silicate Chemistry of the Academy of Sciences of the USSR) is carrying out experiments concerning silicates of rare earths and phase diagrams of binary systems $\text{R}_2\text{O}_3\text{-SiO}_2$ (R= La, Sm, Y, Yb, and others). Critical separation temperatures of all tested systems were between 2050 and 2200°C. The primary crystal phase precipitating below the separation area consisted of cristobalite. The explanation given by O.A. Jessin [Arb. d. 2.Unionskonferenz ueber theoretische und angewandte Elektrochemie, Verlag Akad.Wiss. USSR (Studies of the 2nd Union Conference on theoretical and practical Electrochemistry, published by the Academy of Sciences of the USSR) Kiyev 1949.] for systems with bivalent kations can be extended to the trivalent kations of rare earths. The area of separation

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Liquid separations in the systems ...

G/005/62/000/004/002/002
D029/D109

becomes larger during a transition from an element with large ion radius (La, separation starts at 77 mol% SiO₂) to an element with smaller ion radius (Yp, separation starts at 73.7 mol% SiO₂). For the composition limits of batches with the highest R₂O₃ contents the authors agree with E.M. Levin and St. Block [J. Amer. Cer. Soc. 40 (1957) pp 95-106, 113-118, 41 (1958) pp 49-54]. For extending Levin and Block's calculations to trivalent kations the authors used the oxygen-volume method. If the binding force between the modifier kations and the oxygen atoms is higher than $\frac{1}{2}$, the authors speak of Type A. The binding force of the tested systems was between $\frac{3}{6}$ and $\frac{3}{8}$. In the case of Type A, one oxygen atom is coordinated with two modifier atoms. If the number of oxygen atoms (N_O) is known, the formula for the composition limit of a modifier-rich batch for trivalent modifier kations is

$$R_2O_3 \frac{N_O - 1.5}{2} SiO_2 \quad (4)$$

The article was translated by H. Frahn and edited by P.-O. Kunth (Berlin). There are 2 figures and 1 table.

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S/062/62/000/004/002/013
B110/B101

AUTHORS: Lazarev, A. N., Tenisheva, T. F., Bondar', I. A., and Koroleva, L. N.

TITLE: Structure of pyrosilicates of rare-earth elements

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 4, 1962, 557-560

TEXT: The jumplike structural change of RE pyrosilicates is explained as follows: The coordination number or the shape of the coordination polyhedron of R^{3+} cations is assumed to change at some critical ratios of the dimensions of metal and oxygen ions. This assumption is supported by the fact that the europium ion Eu^{3+} lies at the boundary between the first (La - Sm) and the second (Gd - Ho, Y) group types of rare earths with different pyrosilicate structures. The infrared spectrum showed that pure $Eu_2Si_2O_7$ crystallized with a structure corresponding to the first group. Infrared spectra of $Eu_2Si_2O_7$ with $\leq 3\%$ impurities of other rare

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Structure of pyrosilicates of ...

S/062/62/000/004/002/013
B110/B101

earths, synthesized from europium oxide, showed superposition of spectra of first- and second-type pyrosilicates. Thus, two crystalline phases existed with nearly equal concentrations. Addition of 5 mole% of yttrium oxide effected crystallization of 80-90% of pyrosilicate with a structure corresponding to the second group. Gadolinium with nearly equal ionic radius caused no structural change whereas dysprosium entirely converted $\text{Eu}_2\text{Si}_2\text{O}_7$ to the second-type pyrosilicate. Small RE additions caused

crystallization in two different types, but an intermediate structure has never been observed. This jumplike transition indicates that no continuous series of solid solutions is formed in binary systems of $(\text{R}, \text{R}')_2\text{Si}_2\text{O}_7$, where R and R' are atoms of rare earths of various groups.

In the system $(\text{La}_{1-x}, \text{Yb}_x)_2\text{Si}_2\text{O}_7$, the infrared spectra show superposition of spectra of first- and third-group pyrosilicates at $x = 0.5-0.9$ (two-phase character). Similar observations were made for $(\text{Y}_{1-x}, \text{Er}_x)_2\text{Si}_2\text{O}_7$ at $0.4 < x < 0.8$. X-ray and microscopic studies showed the formation of limited solid solutions also for systems of hydroxyortho- or orthosilicates. An unimportant shift of the band of symmetrical

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Structure of pyrosilicates of ...

S/062/62/000/004/002/013
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stretching vibrations of SiOSi ((La, Yb)₂Si₂O₇: 728-717 cm⁻¹;
(Y, Er)₂Si₂O₇: 635-632 cm⁻¹) confirmed the preservation of the
Si₂O₇ group characteristic of this structure (the SiOSi angle).

No intermediate structure could be observed here either. There are
3 figures.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR
(Institute of Silicate Chemistry of the Academy of
Sciences USSR)

SUBMITTED: November 2, 1961

Card 3/3

BONDAR', I.A.; TOROPOV, N.A.

Determining liquation in fluor-containing slag and rare metal silicate
systems. Stekloobr. sost. no.1:39-41 '63. (MIRA 17:10)

ACCESSION NR: AT4019285

S/0000/63/003/001/0053/0066

AUTHOR: Kalinina, A. M.; Filipovich, V. N.; Kolesova, V. A.; Bondar', I. A.

TITLE: Crystallization produces of lithium silicate glass

SOURCE: Simpozium po stekloobraznomu sostoyaniyu. Leningrad, 1962. Stekloobraznoye sostoyaniye, vy*p. 1: Katalizirovannaya kristallizatsiya stekla (Vitreous state, no. 1: Catalyzing crystallization of glass). Trudy* simpoziuma, v. 3, no.1. Moscow, Izd-vo AN SSSR, 1963, 53-66

TOPIC TAGS: glass, silicate, lithium, glass crystallization, spectroscopy, absorption spectrum

ABSTRACT: The crystallization of glass of the $\text{Li}_2\text{O}-\text{SiO}_2$ system was investigated and the succession of crystalline phases was found to depend on the composition of the crystallizing glass and its thermal treatment. Thermograms of glass are plotted and the problem of the existence of solid silica solutions in lithium disilicate in the crystallization products of glass of high silica content is discussed. The investigation was carried out by x-ray, thermographic and microscopic methods, as well as by means of infrared absorption spectra. Two kinds of samples were studied:

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ACCESSION NR: AT4019285

some were found to range from the eutectic composition (30 mol.% Li_2O) to pure SiO_2 , and others were found to be of a composition ranging from metasilicate to disilicate (36-48 mol.% Li_2O). The temperatures of crystallization were 430, 480, 630, 900-960 C; time: 1-100 hours. Some samples were subjected to thermal treatment over a temperature range of 430-960 C. The appearance of the different crystalline structures (lithium disilicate, metasilicate, cristobalite, tridymite) in relation to the varying experimental conditions is discussed in detail. Orig. art. has: 7 figures and 1 table.

ASSOCIATION: None

SUBMITTED: 17May63

SUB CODE: MT, OP

DATE ACQ: 21Nov63

NO REF SOV: 007

ENCL: 00

OTHER: 008

Card 2/2

BONDAR', I.A., kand.khim.nauk; MOISEYEVA, V.V., kand.khim.nauk

Conference on Silicates. Vest. AN SSSR 33 no.9:77-78 S '63.
(MIRA 16:9)
(Silicates)

ACCESSION NR: AP4038526

S/0020/64/156/003/0619/0621

AUTHOR: Toropov, N. A. (Corresponding member); Bondar', I. A.; Piryutko, M. M.

TITLE: A new garnet type crystalline modification of yttrium orthosilicate.

SOURCE: AN SSSR. Doklady*, v. 156, no. 3, 1964, 619-621

TOPIC TAGS: yttrium orthosilicate, crystallography, x ray diffraction, polymorphism, garnet type crystalline modification

ABSTRACT: In the study of the phase diagram of the binary system, yttrium oxide-silica, the authors were the first to obtain a polycrystalline yttrium orthosilicate. In further studies yttrium silicate single crystals were grown from potassium fluoride solution. The obtained crystals have the shape of symmetrical isometric polyhedrons with well developed polished faces. These crystals were examined goniometrically at the Department of Crystallography of the Leningrad State University im. Zhdanov. From the crystal habit one can observe two simple forms: rhombic dodecahedral and tetragonal trioctahedral. The chemical analysis of these single crystals indicated that they correspond to the formula $2Y_2O_3 \cdot 3SiO_2$. The optical analysis showed that crystals of this compound are isotropic, which

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ACCESSION NR: AP4038526

corresponds to their general garnet appearance. The index of refraction of single crystal material was higher than in the polycrystalline form of the same substance. Studies with high temperature microscope have shown that the new garnet-like form of $2Y_2O_3 \cdot 3SiO_2$ upon heating is transformed to anisotropic modification at 1550 C. It was not possible to obtain the reversible transformation which shows the monotropic character of this transformation. X-ray diffraction studies of single crystals substantiated the existence of the structural difference of this form of yttrium orthosilicate from the polycrystalline hexagonal modification. Orig. art. has: 2 figures.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Chemistry of Silicates, Academy of Sciences SSSR)

SUBMITTED: 20Jan64

ENCL: 00

SUB CODE: SS, IC

NO REF SOV: 002

OTHER: 003

Card 2/2

ACCESSION NR: AP4037239

8/0062/64/000/005/0785/0790

AUTHOR: Bondar', I. A.; Vinogradova, N. V.

TITLE: Phase equilibria in the lanthanum oxide-alumina system

SOURCE: AN SSSR. Izv. Seriya khimicheskaya, no. 5, 1964, 785-790 and side of insert facing p. 786

TOPIC TAGS: lanthanum oxide alumina system, La sub 2 O sub 3 Al sub 2 O sub 3 system, phase equilibrium, phase diagram, x ray analysis, microscopic analysis, La sub 2 O sub 3 .11Al sub 2 O sub 3, LaAl O sub 3, La sub 2 O sub 3 .Al sub 2 O sub 3, synthesis, metastable La sub 2 O sub 3 .11Al sub 2 O sub 3, alkali aluminate, alkaline earth aluminate, property, crystal system, optical property, unit cell dimension, melting, decomposition

ABSTRACT: The phase equilibria in the $\text{La}_2\text{O}_3\text{-Al}_2\text{O}_3$ system were studied microscopically and with x-rays. A phase diagram was constructed (fig. 1). Two compounds were formed in the system, the beta-alumina type $\text{La}_2\text{O}_3\cdot 11\text{Al}_2\text{O}_3$ and the perovskite type LaAlO_3 (or $\text{La}_2\text{O}_3\cdot \text{Al}_2\text{O}_3$). These were also synthesized by calcining corresponding proportions of the oxides up to 1650C and hardening at 2300-1600C. The

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ACCESSION NR: AP4037239

possibility of the existence of a metastable area of $\text{La}_2\text{O}_3 \cdot 11\text{Al}_2\text{O}_3$ was established. $\text{La}_2\text{O}_3 \cdot 11\text{Al}_2\text{O}_3$ was compared with corresponding alkali and alkaline earth aluminates: all crystallize in the hexagonal system, the values of the parameters of their unit cells and their densities are close. The differences in their optical properties and behavior on melting ($\text{BaO} \cdot 6\text{Al}_2\text{O}_3$ does not decompose; Ca, Sr and La aluminates form corundum) are attributed to the peculiarities of the fine structures of these aluminates. "A high temperature microscope assembled by Kh. S. Nikogosyan was used to observe the behavior of the samples on heating from room temperature to fusion." "The authors thank N. A. Toropov for participation in evaluating the present work." Orig. art. has: 4 tables and 6 figures.

ASSOCIATION: Institut khimii silikatov, Akademii nauk SSSR (Institute of Silicate Chemistry, Academy of Sciences SSSR)

SUBMITTED: 29Oct62

ENCL: 01

SUB CODE: IC

NO REF SOV: 008

OTHER: 011

Card

2/3

ACCESSION NR: AP4037239

ENCLOSURE: 01

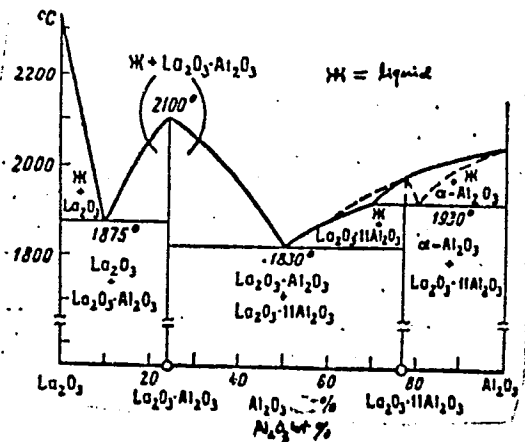


Fig. 1. Phase equilibria in the La_2O_3 - Al_2O_3 system.

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ACCESSION NR: AT4019281

S/0000/63/003/001/0039/0041

AUTHOR: Bondar', I. A.; Toropov, N. A.

TITLE: Determination of liquefaction in fluorinated slag and rare-earth silicate systems

SOURCE: Simpozium po stekloobraznomu sostoyaniyu. Leningrad, 1962. Stekloobraznoye sostoyaniye, vy* p. 1: Katalizirovannaya kristallizatsiya stekla (Vitreous state, no. 1: Catalyzing crystallization of glass). Trudy* simpoziuma, v. 3, no. 1. Moscow, Izd-vo, AN SSSR, 1963, 39-41

TOPIC TAGS: slag, rare earth, liquefaction, silicate, calcium fluoride, glass crystallization, ternary system, lanthanum, samarium, yttrium, ytterbium, immiscibility,

ABSTRACT: The effect of calcium fluoride on crystallization in the ternary system $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$ was studied in order to clarify the mechanism of production of glass-crystalline materials. CaF_2 was added in amounts of 1.5, 5 and 10% by weight. The addition of 5% CaF_2 decreased the viscosity by more than 50% and the temperature of liquefaction to 50-70C. The addition of 10% CaF_2 to the ternary system extended the area of separation. Electron microscopic studies showed that addition of lanthanum, samarium, yttrium and ytterbium silicates leads to the formation of immiscible glass over a wide range of temperature and concentration (35-95% by weight and 1650-2200C). Some of the

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ACCESSION NR: AT4019281

properties of the compositions from the areas of separation were investigated. Studies with the trivalent rare earth cations revealed a direct relationship between the limits of immiscibility and the dimensions of the cations. The effect of the addition of Al_2O_3 on the opalescence or transparency of glass was also determined. The mutual insolubility of components in the liquid phase results from the difference in the strength of the inter-molecular forces in the two immiscible liquids (expansion and compression coefficients, surface tension, heat of evaporation, etc.). Addition of a third component to separating molten metals determines the limit of the stable and metastable areas of immiscibility. Orig. art. has: 1 table and 2 figures.

ASSOCIATION: Institut metallurgii i keramiki AN KNR (Institute of Metallurgy and Ceramics, AN KNR)

SUBMITTED: 17May63

DATE ACQ: 21Nov63

ENCL: 00

SUB CODE: MT

NO REF SOV: 000

OTHER: 004

Card 2/2

1-38512-65 EPR/EWT(n)/EWA(s)/EWP(b)/T/EWP(t) Ps-4 IJP(c) JD/JG/GS

ACCESSION NR: AT5007725

S/0000/63/000/000/0080/0080

AUTHOR: Bondar', I. A.

TITLE: ²⁷Yttrium and ²⁷lanthanum aluminates

SOURCE: AN SSSR. Institut khimii silikatov. Silikaty i oksidy v khimii vysokikh temperatur (Silicates and oxides in high-temperature chemistry). Moscow, 1963. 80-80

TOPIC TAGS: yttrium aluminate, lanthanum aluminate, solid solution, alumina alloy, phase equilibrium, perovskite, garnet ²⁷

ABSTRACT: The authors studied the phase equilibria in the systems $\text{La}_2\text{O}_3\text{-Al}_2\text{O}_3$ and $\text{Y}_2\text{O}_3\text{-Al}_2\text{O}_3$, using microscopic and x-ray phase analysis and high-temperature microscopy. The systems show both a similarity and a difference in the structure of the phase diagrams and in the properties of the compounds obtained. The similarity lies in the formation of perovskite-type compounds ($\text{Ln}_2\text{O}_3\cdot\text{Al}_2\text{O}_3$) and the presence of metastable phases. The difference lies in the general structure of these two phase diagrams (number of compounds, nature of their fusion, and their properties). Whereas the system $\text{La}_2\text{O}_3\text{-Al}_2\text{O}_3$ has only two types of compounds - perovskite and

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ACCESSION NR: AT5007725

and β -alumina-type, the system $Y_2O_3-Al_2O_3$ does not contain the latter compound, but has the aluminates $2Y_2O_3 \cdot Al_2O_3$, $Y_2O_3 \cdot Al_2O_3$ (perovskite-type) and $3Y_2O_3 \cdot 5Al_2O_3$ (garnet-type). A polymorphic transformation at 1000C was observed for the first time in the compound $2Y_2O_3 \cdot Al_2O_3$ by means of the high-temperature microscope.

ASSOCIATION: None

SUBMITTED: 0000063

ENCL: 00

SUB CODE: IC

NO REF SOV: 000

OTHER: 000

Card 2/2mp

ACCESSION NR: AP4042867

S/0062/64/000/007/1158/1164

AUTHOR: Toporov, N. A.; Bondar', I. A.; Galakhov, F. Ya.; Nilogosyan, Kh. S.; Vinogradova, N. V.

TITLE: Phase equilibria in the yttrium oxide-aluminum oxide system.

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 7, 1964, 1158-1164

TOPIC TAGS: yttrium oxide containing system, aluminum oxide containing system, Y sub 2 O sub 3 Al sub 2 O sub 3 system, phase equilibrium, phase diagram, 2Y sub 2 O sub 3 .Al sub 2 O sub 3, 3Y sub 2 O sub 3 .5Al sub 2 O sub 3, Y sub 2 O sub 3, YAlO sub 3, beta alumina type compound, metastable state, K sub 2 O B sub 2 O sub 3 system, potassium oxide containing system, boron oxide containing system, x ray analysis

ABSTRACT: The phase diagram for the $Y_2O_3-Al_2O_3$ system was constructed (see fig. 1 of the enclosure) based on microstructural and x-ray data. The existence of the three compounds $2Y_2O_3 \cdot Al_2O_3$, $3Y_2O_3 \cdot 5Al_2O_3$ and $Y_2O_3 \cdot Al_2O_3$ (or $YAlO_3$) was established. Beta-alumina type compounds were not formed. It was indicated a metastable state may be formed in this system between 2:1 and 3:5 with a eutectic at 1850C. A

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ACCESSION NR: AP4042867

partial phase diagram was constructed of the $K_2O-B_2O_3$ system (see fig. 2 of the enclosure). A metastable region was found in this system between $K_2O.2B_2O_3$ and $K_2O.4B_2O_3$. Orig. art. has: 4 tables and 5 figures.

ASSOCIATION: Institut khimii silikatov im. I. V. Grebanshchikova Akademii nauk SSSR (Institute of Silicate Chemistry, Academy of Sciences SSSR)

SUBMITTED: 03Dec62

ENCL: 02

SUB CODE: IC

NO REF SOV: 002

OTHER: 010

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ACCESSION NR: AP4042867

ENCLOSURE: 01

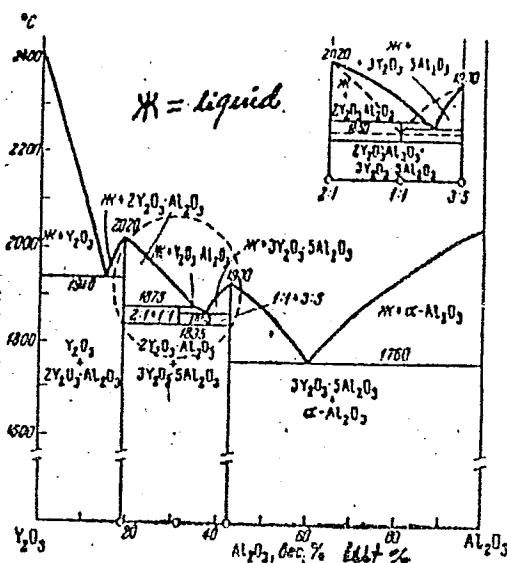


Fig. 1. Phase equilibria in the yttrium oxide-aluminum oxide system.

Card 3/4

ACCESSION NR: AP4042867

ENCLOSURE: 02

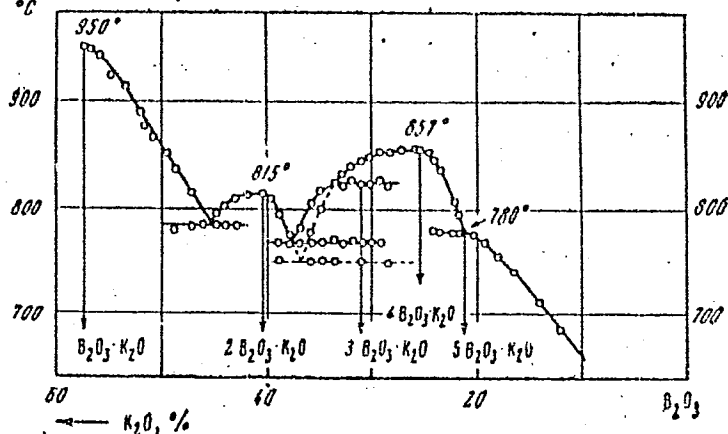


Fig. 2. Phase equilibria in the potassium oxide-boron oxide system.

Card 4/4

TOROPOV, N.A.; BONDAR', I.A.; GALAKHOV, F.Ya.; NIKOGOSYAN, Kh.S.; VINOGRADOVA, N.V.

Phase equilibria in the system yttrium - alumina. Izv. AN SSSR.
Ser. khim. no. 7:1158-1164 J1 '64. (MIRA 17:8)

1. Institut khimii silikatov imeni Grebenshchikova AN SSSR.

L 18269-65 EWT(m)/EWP(e)/EPA(s)-2/EPP(n)-2/EPA(w)-2/ENP(t)/ENP(b) P1-L/Pt-10/
 Pu-L/Pab-10 IJP(c) KWH/JD/WH S/0062/64/C00/007/1325/1326
 ACCESSION NR: AP4042879

AUTHOR: Bondar', I. A.; Galakhov, F. Ya.

TITLE: Phase equilibria in the yttria-alumina-silica system

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 7, 1964,
 1325-1326

TOPIC TAGS: yttrium sesquioxide, aluminum sesquioxide, silicon
 dioxide, ternary system

ABSTRACT: The phase diagram for the $Y_2O_3-Al_2O_3-SiO_2$ system was constructed (see Fig. 1 of the Enclosure), and the areas of segregation and the vitreous state were established. There are 11 stable phases: I, area of two glasses; II, cristobalite; III, yttrium diortho (pyro) silicate; IV, orthosilicate; V, oxyorthosilicate; VI, yttrium oxide; VII, yttrium aluminate; VIII, perovskite type compound; IX, garnet type compound; X, corundum; XI, mullite. In the system, there are 8 invariant points of which 2 are eutectic and 6 are reactive. Orig. art. has: 1 figure and 1 table.

Card 1/3

L 18289-65

ACCESSION NR: AP4042879

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshinkov
Akademii nauk SSSR (Institute of Silicate Chemistry, Academy of
Sciences SSSR)

SUBMITTED: 18Dec63

ENCL: 01

SUB CODE: IC

NO REF SOV: 002

OTHER: 000

Card 2/3

L 18289-65

ACCESSION NR: AP4042879

ENCLOSURE: 01

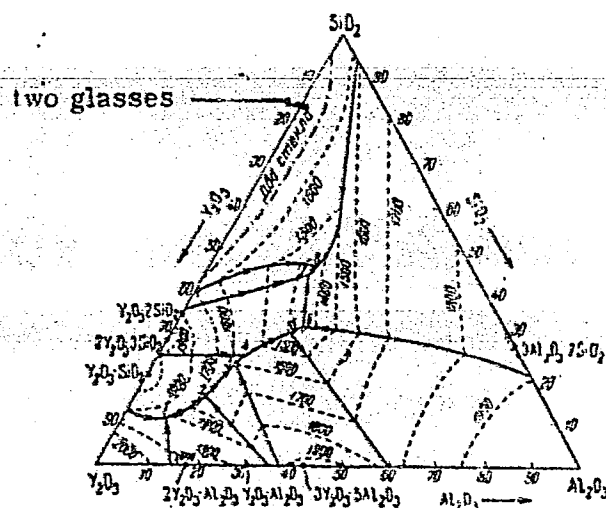


Fig. 1. Phase diagram of the Y_2O_3 - Al_2O_3 - SiO_2 system with inscribed isotherms.

Card 3/3

L 8820-65 EWT(m)/EWP(q)/EWP(b) Pq-4 AS(mp)-2/RAEM(c)/RAEM(e)/ESD(ge)/
ACCESSION NR: AP4045103ESD(t)/RAEM(t) S/0020/64/158/001/0173/0175
RDW/JD/WH

AUTHOR: Toropov, N. A. (Corresponding member AN SSSR), Bondar', I.S.

TITLE: Synthesis of new rare earth silicates ✓

SOURCE: AN SSSR, Doklady*, v. 158, no. 1, 1964, 173-175

TOPIC TAGS: rare earth metal silicate, silicate single crystal, single crystal growth, silicate crystal synthesis, silicate crystal property

ABSTRACT: The present study is a part of a continuing investigation of the structure and peculiar properties of a new class of silicates. ~~Single crystals of rare earth metal silicates, synthetic thalenite, and yttrialite minerals, glasses~~ with interesting spectral characteristics, and silicates of bivalent samarium, europium, and ytterbium are the current objects of investigation. Europium oxyorthosilicate, orthosilicate, and diorthosilicate crystals were synthesized in 1962, and their melting points and optical constants were determined. Since 1962, single crystals of lanthanum, samarium, europium, ytterbium, yttrium, and scandium oxyorthosilicates, ytterbium diorthosilicate, and yttrium silicate have been synthesized for the first time. The

Card 1/2

L 8820-65

ACCESSION NR: AP4045103

crystals were grown from a solution in molten potassium fluoride. Photographs of some of the synthesized crystals are shown in the original article. The quality of the products was determined from optical, x-ray, and infrared-spectroscopy data. Their fine structure and properties are under investigation. Orig. art. has: 1 figure.

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshchikova
Akademii nauk SSSR (Institute of Silicate Chemistry, Academy of Sciences
SSSR)

SUBMITTED: 21Apr64

ATD PRESS: 3107

ENCL: 00

SUB CODE: IC

NO REF SOV: 014

OTHER: 003

Card 2/2

TOROPOV, N.A.; BONDAR', I.A.; SIDORENKO, G.A.; KOPOTENKO, I.N.

Synthesis of rare-earth silicates and certain problems involved
in the classification of naturally occurring minerals of thalenites
and yttrialites. Izv. AN SSSR. Neorg. mat. 1 no.2:218-221 F '65.

(MORA 18:7)

1. Institut khimii silikatev AN SSSR.

BONDAR', I.A.; TENISHEVA, T.F.; SHEPELEV, Yu.F.; TOROPOV, N.A.

New rare-earth diorthosilicate K_3Eu (S:27). Dokl. AN SSSR 160
no.5:1069-1071 F '65. (MIRA 18:2)

1. Institut khimii silikatov im. I.V. Grebenshchikova AN SSSR.
2. Chlen-korrespondent AN SSSR (for Toropov).

L 4020-66 EWT(m)/ETC/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD
 ACCESSION NR: AP5022275 UR/0363/65/001/007/1207/1209
 546.65'284:541.7

21
20
B

AUTHOR: Lazarev, A. N.; Tenisheva, T. F.; Bondar', I. A.

TITLE: More about the polymorphism of rare earth pyrosilicates

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 7, 1965, 1207-1209.

TOPIC TAGS: silicate, yttrium compound, ytterbium compound, erbium compound, scandium compound

ABSTRACT: The polymorphism of $Y_2Si_2O_7$ was investigated by means of infrared spectra. Earlier, spectroscopic methods were used to establish three types of rare earth pyrosilicate structures: I-La-Eu, II-Gd-Ho, including Y, and III-Er-Lu, including Sc. Two modifications of $Y_2Si_2O_7$ were subjected to IR analysis. The low-temperature modification is found to be similar to group III pyrosilicates, and the high temperature one, to group II pyrosilicates. The polymorphic transformation in $Y_2Si_2O_7$ is reversible but slow and apparently involves a rearrangement of the coordination polyhedra of the cations. The form of the band of the antisymmetric vibration of Si-O-Si in the IR spectrum of $Sc_2Si_2O_7$ indicates a lack of rigidity in this bond, i.e., considerable freedom

Card 1/2

L 4020-66

ACCESSION NR: AP5022275

in the internal rotation and deformation of the angle SiOSi. The IR spectra of Yb₂Si₂O₇, Er₂Si₂O₇, Sc₂Si₂O₇, and Y₂Si₂O₇ are compared. Orig. art. has: 2 figures.

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshchikova Akademii nauk SSSR (Institute of Silicate Chemistry, Academy of Sciences SSSR)

SUBMITTED: 12Apr65

ENCL: 00

SUB CODE: IC, MT

NO REF SOV: 006

OTHER: 003

Card

mlr
2/2

TENISHEVA, T.F. ; LAZAREV, A.N.; BONDAR', I.A.; VINOGRADOVA, N.V.

Infrared spectra of rare-earth pyrogermanates and the structure
of GeO_7 anion. Izv. AN SSSR, Ser. khim. no. 10: 1764-1771 '65.
(MIRA 18:10)

1. Institut khimii silikatov im. I.V. Grebenshchikova AN SSSR.

L 22432-61 EMT(m)/EMP(t)/EMP(b) IJP(c) JP/JG
 ACCESSION NR: APS000460 S/0062/64/000/011/1921/1925

AUTHOR: Bondar', I. A.

TITLE: The relationship between experimental data and theoretical calculations of liquidus temperatures in simple binary systems

SOURCE: AN SSSR, Izvestiya. Seriya khimicheskaya, no. 11, 1964, 1921-1925

TOPIC TAGS: binary system liquidus temperature, liquidus temperature, eutectic, liquidus temperature formula, lanthanide series

ABSTRACT: The relationship existing for ideal solutions between heat and melting temperature, the molar ratio of the starter oxides and the number of atoms in the component was used to derive simple equations for determination of the liquidus temperature in eutectic systems. The basic formulas are

$$\ln x_1 = N_1 \left(1 - \frac{T_1}{T} \right) \quad \ln x_2 = N_2 \left(1 - \frac{T_2}{T} \right)$$

wherein x_1 and $x_2 = 1 - x_1$ are the molar concentrations of the two oxides, T_i the melting point of the component i , °K, and N_i the overall number of atoms in the

L 22437-65

ACCESSION NR: AP5000480

i molecule. By changing the ratio of starter oxides, a set of values for liquidus temperatures may be obtained from which the liquidus curves are constructed. Liquidus temperatures and eutectic points were determined for 4 partial silicate systems: $\text{La}_2\text{O}_3\text{-La}_2\text{O}_3\text{.SiO}_2$, $\text{Sm}_2\text{O}_3\text{-Sm}_2\text{O}_3\text{.SiO}_2$, $\text{Y}_2\text{O}_3\text{-Y}_2\text{O}_3\text{.SiO}_2$, $\text{Yb}_2\text{O}_3\text{-Yb}_2\text{O}_3\text{.SiO}_2$ and 2 aluminum systems: $\text{La}_2\text{O}_3\text{-La}_2\text{O}_3\text{.Al}_2\text{O}_3$ and $\text{Sm}_2\text{O}_3\text{-Sm}_2\text{O}_3\text{.Al}_2\text{O}_3$. Eutectics was determined between the oxide of the rare earth element and a compound of the orthosilicate ($\text{Ln}_2\text{O/SiO}_4$) or the perovskite (LnAlO_3) type. Oxides of the lanthanides and their compounds were thus the initial components for calculation. Comparison of the experimental and theoretical results is tabulated and presented in graphs. Their analysis showed that the maximal deviation is about 75 C and 16 mol. % and the minimal deviation is 25C and 1.5 mol. %. The relative percent deviation for the 6 systems under study is 10% for the eutectic composition and 3% for its temperature. Such calculations are valuable in practice, for the evaluation of the order of magnitude of liquidus temperatures and the compositions of eutectics in simple systems. However, their limitations should be considered: the theoretical assumption of an ideal solution (Pauli law), from which it follows that the difference between experimental and theoretical data is normal, these calculations can in no way predict the

Card 2/3

L 22432-65
ACCESSION NR: AP5000480

probability of compound formation of the immiscible regions or of peritectic reactions. They confirm the presence of eutectic mixtures in systems, and are useful as such. Orig. art. has: 2 formulas, 6 tables and 6 figures

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshchikova Akademii nauk SSSR (Institute of Chemistry of Silicates, Academy of Sciences SSSR)

SUBMITTED: 05Feb63

ENCL: 00

SUB CODE: MM, GC

NR REF SOV: 000

OTHER: 004

Cerd 3/3

L 23026-t5 EWT(m)/EWP(b)/EWP(o)/EWP(t) Pq-4 IJP(c) WH/JD
ACCESSION NR: AP5000492 S/0062/64/000/011/2110/2112

22
14
B

AUTHOR: Bondar', I. A.

TITLE: The breakdown of solid solutions as a process of dispersive solidification of silicate materials

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 11, 1964, 2110-2112

TOPIC TAGS: solid solution dissociation, dispersive solidification, lanthanum silicate, ytterbium silicate, microhardness, glass

ABSTRACT: The breakdown of solid solutions of lanthanum and ytterbium silicates is being examined as a model of such processes. The reason for such transformations may be sought in the tendency to constancy with minimal storage of free energy. The 2 silicates were shown to form limited solid solutions, pseudo-binary systems of the diorthosilicates of La and Yb, whose phase diagram is presented. Their behavior was studied in solid solutions containing 30-50% $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ and 70-50% $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ (weight %). These were heated, quenched at 1600-1400 C, then cooled. Microscopic examination showed the dissociation of

Card 1/3

L 23026-65

ACCESSION NR: AP5000492

2

solid solutions containing 46% of the La and 50% of the Yb substance. Between 1600-1550C this solid solution is in an unsaturated state and has a single-phase structure. It will become saturated at 1500 and lower; then the matrix phase will become supersaturated by the Yb compound, its nuclei forming at the boundaries of the initial $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ nuclei, at a rate proportional to the cooling rate. At a slow cooling rate of the specimens containing 40% $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$, the number of nuclei of the new phase is low; the crystals $\text{Yb}_2\text{O}_3 \cdot 2\text{SiO}_2$ will be seen all over the surface of the cut in the initial $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$. At a rapid cooling rate from 1500, a breakup of the supersaturated solution will occur for a large number of centers and nuclei will form at the boundaries as well as within the granules. Then minute crystals will be obtained. Such Yb compound crystals in the La compound matrix may be seen only with 1000 fold enlargement. This is called dispersive solidification and determines the considerable changes of properties, particularly increased strength and other improved physico-mechanical indices of glass-crystalline materials. Microhardness for a homogeneous solid solution of $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ is 625 kg/mm²; if minute crystalline particles of the second phase are formed, this value will amount to 950-1000 kg/mm². Orig. art. has: 4 figures

Cord 2/3

L 23026-65
ACCESSION NR: AP5000492

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshchikova Akademii nauk
SSSR (Institute of Silicate Chemistry Academy of Sciences SSSR)

SUBMITTED: 24Apr84

ENCL: 00

SUB CODE: MT, GC

NR REF SOV: 001

OTHER: 001

Card 3/3

L 61650-65 INT(m)/T/ENP(t)/ENP(b)/ENA(c) IJP(c) JD/JG

ACCESSION NR: AP5015594

UR/0062/65/000/005/0925/0926

548,73+546,65

22

21

AUTHOR: Smolin, Yu. I.; Shepelev, Yu. F.; Bondar', I. A.; Toropov, N. A.

10

TITLE: Concerning a certain structural type in the series of rare earth oxyorthosilicates

21

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 5, 1965, 925-926

TOPIC TAGS: rare earth compound, dysprosium compound, holmium compound, ytterbium compound, erbium compound, thulium compound, lutetium compound, rare earth oxyorthosilicate, lattice parameter

ABSTRACT: The article reports on certain results of an x-ray analysis of the oxyorthosilicates of dysprosium, holmium, erbium, and ytterbium ($\text{Ln}_2\text{O}_3 \cdot \text{SiO}_2$). Powder patterns obtained with CuK radiation showed that the oxyorthosilicates were completely isostructural. The unit lattice parameters and space group of the single crystal $\text{Yb}_2\text{O}_3 \cdot \text{SiO}_2$ were determined, and the crystal was found to be orthorhombic. The lattice parameters a , b , and c of the oxyorthosilicates of Dy, Ho, Er, Tm, Yb, and Lu were determined and are tabulated. It was found that the oxyorthosilicates of Tu and Lu apparently also belong to the structural type of the other compounds.

Card 1/2

L 61650-65

ACCESSION NR: A15015594

"A detailed evaluation of the results will be published after a complete determination of the structure of $\text{Yb}_2\text{O}_3 \cdot \text{SiO}_2$, which is now being investigated."
Orig. art. has: 1 table.

ASSOCIATION: Institut khimii silikatov im. I. V. Grabenshchikova Akademii nauk
SSSR (Institute of Silicate Chemistry, Academy of Sciences, SSSR)

SUBMITTED: 22 Aug 64

ENCL: 00

SUB CODE: IC

NO REF. NOV: 001

OTHER: 000

Card

221
2/2

L 00394-66 ENP(e)/ENT(m)/ENP(i)/ENP(t)/ENP(b) IJP(o) JD/GS/WH
 ACCESSION NR: AT5013390 UR/0000/65/000/000/0120/0123

AUTHOR: Bondar', I. A. *44*

TITLE: The effect of a third component on liquation in certain binary silicate systems *27*

SOURCE: AN SSSR, Institut khimii silikatov. *44* Strukturnyye prevrashcheniya v steklakh pri povyshennykh temperaturakh (Structural transformations in glass at high temperatures). Moscow, Izd-vo Nauka, 1965, 120-123

TOPIC TAGS: liquation, glass crystallization, *44* silica, alumina, niobium oxide, yttrium oxide

ABSTRACT: The article is devoted to the role of a third oxide on the liquation limits in two-component silicate systems. The effect of silica and niobium pentoxide on liquation processes in the yttrium oxide - silica system was investigated. It is found that the range of phase separation is limited by the compositions 43-95 wt.% (74.8-98.6 mole %) SiO₂. The upper critical point of phase separation, above which the glass becomes homogeneous, corresponds to 2200C and to the composition 20 wt.% Y₂O₃ and 80% SiO₂ (6.2 mole % Y₂O₃ and 93.9 mole % SiO₂). The crystallization of silica (cristobalite) takes place below the region

Cord 1/2 *4*

L 00394-66

ACCESSION NR: AT5013390

of phase separation. The temperature of equilibrium coexistence of the two glasses and cristobalite is 1700C. Liquation in the system $Y_2O_3-Al_2O_3-SiO_2$ is also discussed for the sake of comparison. It is concluded that liquation is a very complex phenomenon which depends on a large number of factors. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 21Dec64

ENGL: 00

SUB CODE: MT

NO REF SOV: 005

OTHER: 002

dy
Card 2/2

LAZAREV, A.N.; TENTUSHEVA, T.F.; BONDAR', I.A.

More on the polymorphism of rare-earth pyrosilicates. Izv. AN SSSR.
Neorg. mat. 1 no.7:1207-1209 J1 '65. (MIRA 18:9)

1. Institut khimii silikatov Imeni I.V.Grebenshchikova AN SSSR.

ACC NR: AT6002241

SOURCE CODE: UR/2564/65/006/000/0111/0115

AUTHOR: Bondar', I. A.; Koroleva, L. N.; Toropov, N. A.

ORG: none

TITLE: Growing of rare earth silicate single crystals of oxyortho- and diortho-type from a solution-melt

SOURCE: AN SSSR, Institut kristallografi. Rost kristallov, v. 6, 1965, 111-115

TOPIC TAGS: single crystal growing, silicate, lanthanum compound, samarium compound, yttrium compound, ytterbium compound, scandium compound

ABSTRACT: Oxyortho ($\text{Ln}_2\text{O}[\text{SiO}_4]$) and diorthosilicates ($\text{Ln}_2\text{Si}_2\text{O}_7$) of lanthanum, samarium, ytterbium, yttrium, and scandium were prepared in single crystal form by growing from a solution-melt. Potassium fluoride was chosen as the solvent and mineralizer. Coprecipitation with NH_4OH was used to achieve an intimate mixture of silica and rare earth oxide. The mixture was then heated in a crucible to 1300 – 1320C for 8 hr, kept at this temperature for 4 – 6 hr, then slowly cooled from 1320 to 850C. The experiment lasted 300 hr. La, Sm, Yb, Y, Sc oxyorthosilicate and Yb diorthosilicate crystals measuring 4 x 3 x 2 mm and less were obtained. Their quality was checked by x-ray phase analysis, microscopic analysis, and infrared spectroscopy, and the corresponding data are tabulated. Orig. art. has: 6 figures and 2 tables.

SUB CODE: 20/ SUBM DATE: none

Card 1/1

L 7081-66 EWT(m)/EWP(t)/EWP(b) IJP(c) JD/JG

ACC NR: AP5027686

SOURCE CODE: UR/0062/65/000/010/1764/1771

AUTHOR: Tenisheva, T. F.; Lazarev, A. N.; Bondar', I. A.; Vinogradova, N. V.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikova, Academy of Sciences USSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: Infrared spectra of rare earth element pyrogermanates and structure of the Ge_2O_7 anion.

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 10, 1965, 1764-1771

TOPIC TAGS: IR spectrum, inorganic anion, crystal structure, crystal structure analysis, chemical valence, rare earth compound

ABSTRACT: The types of crystal structures formed by the rare earth element pyrogermanates were determined from their IR spectra, and the structures of these rare earth pyrogermanates and pyrosilicates were compared. Three structural types of pyrogermanates were established: type I--La; type II--Pr, Nd, Sm, Gd; type III--Dy, Y, Er, Yb. The shift, in comparison to pyrosilicates, of

Card 1/2

UDC:543.422+546.65

L 7081-66

ACC NR: AP5027686

the stability limits of each type of structure was attributed to the increased distance between the oxygen atoms in the germanate tetrahedra. The valence angle of GeOGe in the Ge_2C_7 anion increases in going from type I to the type II and III pyrogermanates. As with the pyrosilicate SiOSi angle, the increase in the GeOGe angle is associated with a decrease in the ion radius, reduction in the basicity of the cation and increase in the covalency of the $\text{Ln}^{+}-\text{O}^{-}(\text{Ge})$ bond. "M. M. Piryutko conducted the chemical analysis." Orig. art. has: 2 tables, 4 figures and 1 equation

SUB CODE: IC,GP,SS/ SUBM DATE: 02Jul63/ ORIG REF: 006/ OTH REF: 005

nw
Card 2/2

L 24279-66 EWP(e)/EWT(m)/EWP(j)/T/EWP(t)/ETC(m)-6 IJP(c) DS/JD/WW/JG/RM/WH
ACC NR: AP6009792 SOURCE CODE: UR/0062/66/000/002/0212/0217

AUTHOR: Bondar', I. A.; Toropov, N. A.

ORG: Institute of Silicate Chemistry im. I. V. Grebenshchikov, Academy of Sciences, SSSR (Institut khimii silikatov Akademii nauk SSSR)

TITLE: Phase equilibria in the ytterbium oxide-alumina system and their comparison with equilibria in other $\text{Ln}_2\text{O}_3\text{-Al}_2\text{O}_3$ systems

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 2, 1966, 212-217

TOPIC TAGS: phase diagram, phase equilibrium, alumina, aluminum oxide, aluminate, samarium compound, ytterbium compound, hardness, density, melting point, chemical resistant material, rare earth compound

ABSTRACT: Phase diagrams were constructed for the $\text{Yb}_2\text{O}_3\text{-Al}_2\text{O}_3$ and $\text{Sm}_2\text{O}_3\text{-Al}_2\text{O}_3$ systems. X-ray studies confirmed the compounds $2\text{Yb}_2\text{O}_3\cdot\text{Al}_2\text{O}_3$ and $3\text{Yb}_2\text{O}_3\cdot 5\text{Al}_2\text{O}_3$. The physical properties of the La, Er, Sm, Y, Tb and Yb aluminates were compared. The infusibility, hardness, density and chemical resistance of the rare earth aluminates helps make them suitable for high frequency ceramics, luminophores, materials for absorption of neutrons and protection against gamma radiation, and

Card 1/2

UDC: 539.26+546.65

L 24279-66

ACC NR: AP6009792

materials resistant to high temperature and aggressive media. Orig. art.
has: 1 table and 5 figures.

SUB CODE: 11, 07/ SUBM DATE: 02Sep63/ ORIG REF: 003/ OTH REF: 001

Card 2/2 ✓

BONCH - BRUYEVICH, M.D.

DECEASED
1956

1962
~~1961/3~~

SEE ILC

AERIAL PHOTOGRAPHY

(MIKHAIL DMITRIYEVICH BONCH_BRUYEVICH)

USSR/ Scientific Organization

Card 1/1 Pub. 124 - 16/26

Authors : Bonch-Bruevich, V. D., Dr. of Histor. Sc.

Title : At the Institutions of the Academy of Sciences USSR

Periodical : Vest. AN SSSR 10, 84-86, Oct 1954

Abstract : Announcements are made by the Academy of Sciences USSR about the friendly exchange of books and literature between the Soviets and the Chinese Peoples Republic and about the opening of a library dealing exclusively in scientific - Atheistic literature.

Institution : Academy of Sciences USSR

Submitted :

BONCH-BRUYEVICH, V.D.

V.I. Lenin on inventions. Izobr. i rats. no. 6:8-9 Je '59.
(MIRA 12:9)

(Lenin, Vladimir Il'ich, 1870-1924)

BONCH-BRUYEVICH, V.D.

Lenin's perspicacious ideas are found everywhere. Nauka i zhizn'
27 no. 4:12-13 Ap '60. (MIRA 14:5)
(Lenin, Vladimir Il'ich, 1870-1924)

BONDAR, I. A.

CERAMICS, EUROPEAN ASSOCIATION OF -
Eighth International Ceramic
Congress - Copenhagen, Denmark,
21-25 May 62

5

BUDNIKOV, Petr P., Corresponding Member
of the Academy of Sciences USSR. Pro-
fessor and Head, Chair of General Silicate
Technology, Moscow Chemical Technology
Institute imeni D. I. Mendeleyev -
"Mullite-carborundum and corundum-carbor-
undum refractories resistant to spalling"
(Section II)

TORPOV, Nikita A., BONDAR, I. A., and
GALAKHOV, F. Ya., Institute of Chemistry
of Silicates, Academy of Sciences USSR-
"Solid high temperature silicate solutions
of rare earth elements" (Section I)

TOMANEK, Vladimir, Dipl. Ing., Dr., Prague-
"New criteria for the evaluation of
refractory clay and slate" (Section II)

BONDAR', I.I.; SHCHEKOTOVA, L.F.

How we raised labor productivity and improved the quality of
products in the dry breakfast food section. Kons. i ov. prom. 16
no.9:25-27 S '61. (MIRA 14:8)

1. Dnepropetrovskiy zavod pishchevykh kontsentratorov.
(Dnepropetrovsk--Food, Dried)

BONDAR¹, I.I.

Effect of development workings on the degasification of a coal
massif. Sbor.trud.Inst.gor.dela AN URSR no.5:114-120 '58.
(MIRA 15:5)
(Mine gases)

JAVORKA, Ede; BONDAR, Istvan

Which one is the mos' suitable television antenna designed
by the Telecommunication Engineering Enterprise. Pt.4.
Radiotechnika 15 no.7:271-272 J1 '65.

ALMAZOV, A.M., doktor geogr. nauk; BONDAR, K.; VAGIN, N.F.;
 GEDERIM, V.; D'YAKONU, K. [Diaconu, C.]; MITSE, P. [Mitse, P.];
 STENESKU, V. [Stanescu, V.]; STENESKU, S. [Stanescu, S.];
 MAYSTRENKO, Yu.G.; MIKHAYLOV, V.N., kand. geogr. nauk;
 NIKIFOROV, Ya.D., kand. tekhn. nauk; RAY, I.A.; RODIONOV,
 N.A.; MINENKO, V.M., red.; ZARKH, I.M., tekhn. red.

[Hydrology of the region of the Danube estuary] Hidrologia
 ust'evoi oblasti Dunaiia. [By] A.M. Almazov i dr. Moskva,
 Gidrometeoizdat (otdelenie), 1963. 382 p. (MIRA 17:1)

1. Gosudarstvennyy okeanograficheskiy institut Glavnogo
 upravleniya gidrometeorologicheskoy sluzhby pri Sovete
 Ministrov SSSR (for Mikhaylov, Nikiiforov, Rodionov).
2. Dunayskaya gidrometeorologicheskaya observatoriya Uprav-
 leniya gidrometeorologicheskoy sluzhby Ukr.SSR (for Vagin, Ray).
3. Institut gidrobiologii AN Ukr.SSR (for Almazov, Maystrenko).
4. Nauchno-issledovatel'skiy institut gidrotekhniki Komiteta
 vodnogo khozyaystva Rumynskoy Narodnoy Respubliki (for Bondar,
 Gederim, D'yakonu, Mitse, Stenesku, V., Stenesku, S.).

BONDAR, L.

BONDAR, L
Conditioning in the shoe industry. p. 87

Vol. 5, No. 4, August, 1955 Budapest, Hungary BOR-ES CIPOTECHNIKA

SO: Monthly List of East European Accessions, (EEAL), IC, Vol. 5
No. 3, March, 1956

BONDAR', L.; DUBININ, N.

Mezhdurechensk. Kemerovo, Kemerovskoe knizhnoe izd-vo, 1958.
34 p. (MIRA 15:3)

(Mezhdurechensk--Description)

BONDAR¹, L.A. [Bondar, L.O.]

Vascularization of the lymphatic nodes of the human abdominal group in connection with their structural characteristics.
Dop. AN URSR no.10:1376-1380 '61. (MIRA 14:11)

1. Kiyevskiy meditsinskiy institut. Predstavleno akademikom AN USSR V.G.Kas'yanenko [Kas'ianenko, V.H.].
(LYMPHATICS)

L 32177-66 ENT(m)/I/ETI/EMP(+) LIP(+) (M)/SD
ACC NR: AP6011315 (A)

SOURCE CODE: UR/0363/66/002/003/0440/0442

AUTHOR: Budennaya, L. D.; Bondar', L. A.; Mizetskaya, I. B.

ORG: Institute of Semiconductors of the Academy of Sciences, UkrSSR (Institut poluprovodnikov kademii nauk UkrSSR)

TITLE: Cadmium-selenium system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 3, 1966, 440-442

TOPIC TAGS: cadmium selenide, cadmium, selenium, phase diagram, solid mechanical property, *HARDNESS*

ABSTRACT: The microstructure of the cadmium-selenium system was examined by microscopic and x-ray techniques and the microhardness of annealed samples of cadmium-selenium alloys was investigated. The object of the work was to fill the gap in the literature concerning properties of A^{III}B^{VI}-type semiconductor systems. The Cd-Se alloy samples were prepared by fusing cadmium (10⁻³% impurities) and selenium (99.7% purity) in various ratios in evacuated quartz ampoules. Each sample, 15 g of total weight, was doubly molten and annealed for 400 hours in vacuo at 200°C. The

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UDC: 546.3-19-48-23:541.123.2

L 32177-66

ACC NR: AP6011315

phase diagram of the Cd-Se system is shown in figure 1. A two-phase microstructure was found for all Cd-Se ratios examined. The phase diagram of the Cd-Se system was confirmed by microscopic, x-ray, and microhardness techniques. Orig. art. has: 3 figures and 2 tables.

Card 2/3

L 32177-66

ACC NR: AP6011315

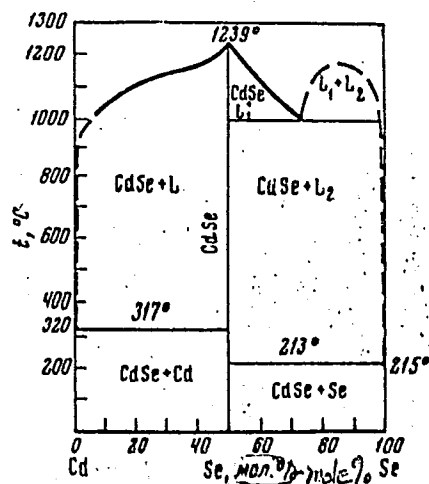


Fig. 1

SUB CODE: 07/ SUBM DATE: 07Apr65/ ORIG REF: 002/ OTH REF: 002

Card 3/3 mc

GRDINA, Yu.V., prof., doktor tekhn. nauk; BONDAR', L.A., inzh.

Kinetics of crystal nucleation. Izv. vys. ucheb. zav.; chern.
met. 2 no.4:73-78 Ap '59. (MIRA 12:8)

1.Sibirskiy metallurgicheskiy institut. Rekomendovano kafedroy
metallovedeniya i termooobrabotki Sibirskogo metallurgicheskogo
instituta.

(Crystallization) (Metal crystals)

USSR/Human and Animal Morphology - Normal and Pathological.
Pathological Anatomy

S

Abs Jour : Ref Zhur Biol., No 23, 1958, 106028

Author : Novitskiy, S.T., Bondar', L.A.

Inst : -

Title : A Rare Case of Malformation in Combination with Situs Inversus

Orig Pub : Vrachebn. delo, 1956, No 9, 895-986

Abstract : In a seven months old premature infant, the esophagus was represented by two separate parts, of which the upper one, terminating in a dilatation, was located behind the trachea. The lower segment of the esophagus began at a distance of seven millimeters from the blind termination of the upper one. In the area where the lower segment of the esophagus was in contact with the bifurcation of the trachea, there was an esophago-tracheal fistula. Septum between the atria developed incompletely. On the

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Pathological Anatomy

Abs Jour : Ref Zhur Biol., No 23, 1958, 106028

anterior surface of the stomach, the accessory pancreas was located. The spleen was lobulated. The loops of the small intestine were situated in the body cavity on the left and on the front, and the large intestine was found on the right and posterior side. It seemed impossible to differentiate the large intestine into segments. The mesenterium of the small intestine was anomalous, and the greater omentum was absent. The kidneys were placed intraperitoneally. -- M.B. Novikov

Card 2/2

BONDAR', L.A. (Kiev, Ul. Artema, d. 99, kv.1)

Arteriovenous anastomoses of the gastric wall. Arkh.anat. gist. i embr.
33 no.1:69-70 Jz-Mr '56 (MIRA 12:1)

1. Iz kafedry topograficheskoy anatomii i operativnoy khirurgii
(zav. - prof. S.T. Novitskiy) Kievskogo meditsinskogo instituta im.
akad. A.A. Bogomol'tsa (dir. - dots. I.P. Alekseyenko).
(STOMACH, blood supply,
arteriovenous anastomoses (Rus))

BONDAR', L.A. [Bondar, L.O.]

Morphological differences of the endothelium of arterial and venous vessels of the lymph nodes. Dop. AN URSR no.5:662-666 '64.

(MIRA 17:6)

1. Kiyevskiy meditsinskiy institut. Predstavleno akademikom AN Ukr SSR V.G.Kas'yanenko [Kas'ianenko, V.H.].

L 63091-65 F3D/ENT(1)/ENG(v)/EEG-4 G1/WS-4
 ACCESSION NR: AP5020350 UR/0141/65/008/003/0437/0440
 523.164.4

AUTHOR: Bondar', I. N. Krotikov, V. D. Stankevich, K. S. Tseytlin, N. M. 46
 35 55 55 55 44
 12

TITLE: Spectra of some remnants of supernovas in the decimeter band 8

SOURCE: IVUZ, Radiofizika, v. 8, no. 3, 1965, 437-440

TOPIC TAGS: radio astronomy, decimeter wave, spectrum analysis, supernova

ABSTRACT: The spectra of sources SN 1572, IC 443, and W 44 were investigated on
 decimeter band frequencies of 960, 740, and 513 Mc using a radiometer with a sensi-
 tivity on the order of 10^4 K at a 1 second time constant and a nearly linear response
 in the working portion of its dynamic range. It was calibrated against Virgo-A,
 Cygnus-A, and Cassiopeia-A. Extended sources IC 443 and W 44 had identical spectral
 indices in the decimeter and meter bands, but SN 1572 exhibited a different spec-
 tral index in the region from 178 to 513 Mc ($\alpha = 0.23$) than in the rest of the meter
 and decimeter bands ($\alpha = 0.68$). Tables cite data for 960, 740, and 513 Mc. Orig.
 art. has: 2 tables.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom

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